ARS-2018/2018E
SCSI to SATA Mirror Smart

User's Manual

—— Version: 1.0 ——

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Chapter 1 Introduction

1.1 Overview

ARS-2018/2018E is an internal/external SCSI to SATA RAID subsystem using cost-effective SATA hard drives to achieve SCSI efficiency. Both 2018 and 2018E adopt ACARD's ROC (RAID-On-Chip) technology, which is essential for drive mirroring, data rebuilding and protection. The two types are all operated through LCD panel and utility. They also support SATA hot swap, and make system setting more convenient.

1.2 Features

- Supports RAID 1, JBOD and Normal
- Supports SATA hard drives
- Supports real time rebuilding (up to 3.0GB per minute)
- Supports drive hot swap
- Supports multitasking
- Supports ROC SCSIDE engine
- Minimized CPU utilization
- LCD panel for setting and monitoring the status of system
- LED indicators for showing the status of hard drives
- Warning signal for system failure
- E-mail notification for system failure
- Key lock for data security
- On-board Flash ROM for quick firmware update
- Automatic fan speed adjustment to keep a stable environment
- Supports Windows 98/ME/2000/XP/Server 2003, Linux, Mac OS, Sun Solaris, etc.

1.3 Specifications

- Host interface:
    - Ultra 160 LVD SCSI features with data transfer rate up to 160MB/s

- ◆ SCSI daisy chain up to 15 sets
- ◆ Selectable SCSI ID from 0 to 15
- ■ Drive interface: SATA
- ■ Remote management: GUI utility software
- ■ Error notification: via built-in buzzer, LED or E-mail
- ■ Dimension:
  - ◆ ARS-2018 : 215 (L) $\times$ 148 (W) $\times$ 85 (H) mm
  - ◆ ARS-2018E : 280 (L) $\times$ 172 (W) $\times$ 152 (H) mm
- ■ Power supply: 100V~240V, 50~60Hz auto-switching power supply
- ■ Temperature:
  - ◆ Operation : 5°C~40°C (not condensed)
  - ◆ Non-operation : $-$ 5°C~50°C
- ■ Humidity : 10%~75%

1.4 Package

- ■ ARS-2018/2018E $\times$ 1
- ■ Support CD $\times$ 1
- ■ User's manual $\times$ 1
- ■ Power cord (ARS-2018E only) $\times$ 1
- ■ Pack of screws $\times$ 2
- ■ Key $\times$ 2
- ■ External SCSI cable (ARS-2018E only) $\times$ 1
- ■ Terminator (optional)

1.5 Quick Start

Install ARS-2018:

Step 1: Prepare 2 SATA hard drives of the same model.

Step 2: Unlock the 2 trays and take them out of ARS-2018.

Step 3: Put a hard drive into each tray and aim its end to the tray's connector.
Fasten the hard drive with screws.

Step 4: Put the 2 trays back to ARS-2018 and lock them.

Step 5: Set a proper and unique SCSI ID for ARS-2018 (see 2.3.1).

Step 6: Fasten ARS-2018 to the interior of PC with screws.

Step 7: Connect ARS-2018 to the SCSI card with an internal SCSI cable. Be sure to add a terminator to the end (see 2.4).

Step 8: Connect ARS-2018 with 2 power cords to let Mirror Smart work well.

Step 9: After powering on, the system will detect a hard drive named Mirror Smart 2018. Before using it, do HDD partition and format if necessary.

Install ARS-2018E:

Step 1: Prepare 2 SATA hard drives of the same model.

Step 2: Unlock the 2 trays and take them out of ARS-2018E.

Step 3: Put a hard drive into each tray and aim its end to the tray's connector. Fasten the hard drive with screws.

Step 4: Put the 2 trays back to ARS-2018E and lock them.

Step 5: Set a proper and unique SCSI ID for ARS-2018E (see page 2.3.2).

Step 6: Connect ARS-2018E to the SCSI card with an external SCSI cable. Be sure to add a terminator to the end (see 2.5).

Step 7: Connect ARS-2018E with a power cord.

Step 8: Power on ARS-2018E first and then the PC.

Step 9: After powering on, the system will detect a hard drive named Mirror Smart 2018. Before using it, do HDD partition and format if necessary.

NOTICE:

(1) Be sure to unlock the tray before removing it.

(2) The provided trays are designed for ACARD ARS-2018/2018E/ 2019. Do not use any substitutes without ACARD's authorization. ACARD will not maintain or provide any after service/warranty if the problem is due to using a substitute.
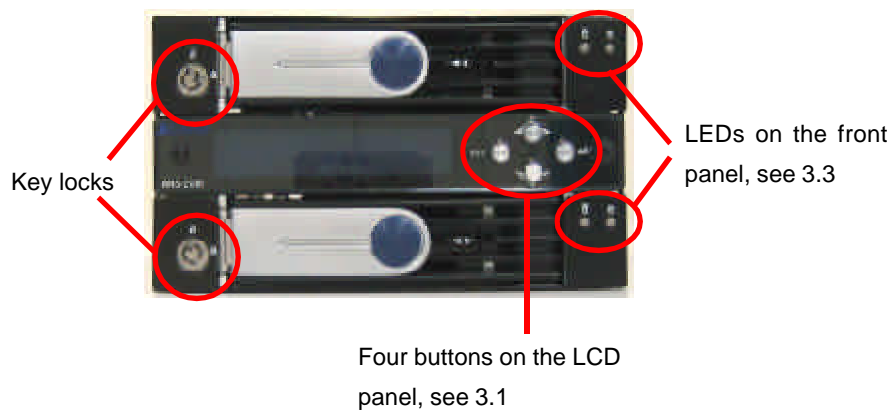

1.6 HDD Compatibility

ARS-2018/2018E is particularly designed for SATA hard drives.Visit http://
www.acard.com to get the newest support list of hard drives. ARS-2018/2018E is
also compatible with various kinds of SCSI cards, and can operate well in Mac OS
and Linux.

If your hard drive is not approved by ACARD, contact us or local distributor for
assistance.

Chapter 2 Installation

ARS-2018

The front

Key locks

LEDs on the front panel, see 3.3

Four buttons on the LCD panel, see 3.1

The back

SE/LVD SCSI connector

Power connectors

SCSI ID & function switch, see 2.3.1

ARS-2018E

The front

Key locks

LEDs on the front
panel, see 3.3

Four buttons on the
LCD panel, see 3.1

The back

SE/LVD SCSI connectors

SCSI ID switch, see 2.3.2

Function switch,
see 2.3.2

RS-232 (for test only)

Power connector

Power switch
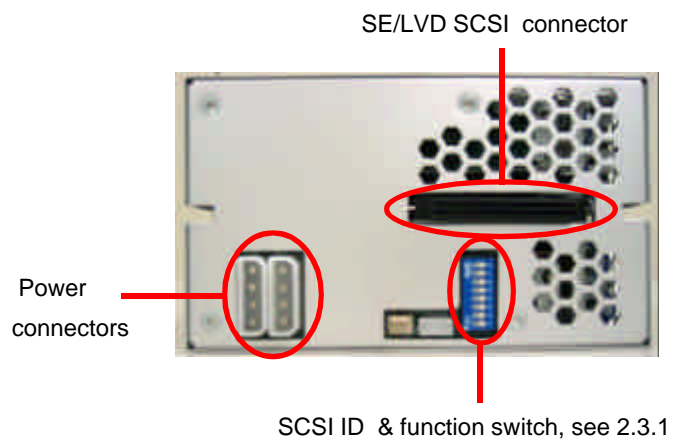
2.1 Install HDD into ARS-2018

Follow the steps below to install the hard drives into the trays of ARS-2018.
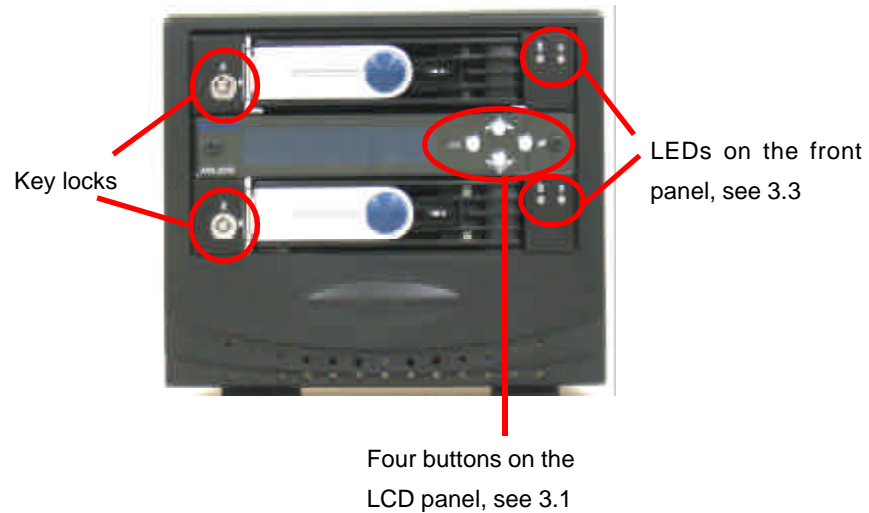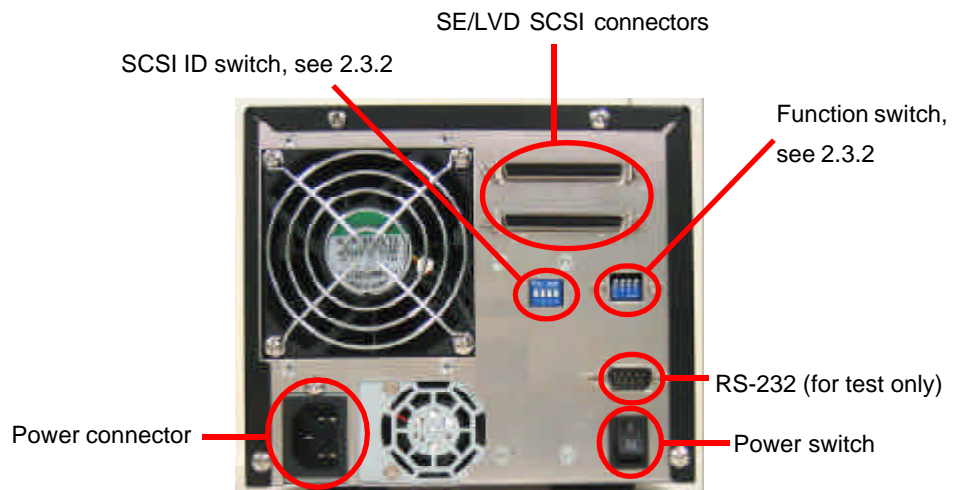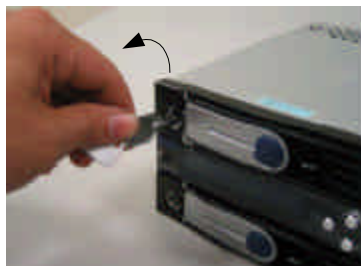
(1). Unlock.   (2). Open the tray by pushing the fastener
                                            to the left.

(3). Pull the handle to slide the   (4). Put a hard drive into the tray, and aim
tray out.   its end to the connector of the tray.

(5). Push the hard drive till it attaches   (6). Turn the tray carefully and fasten with
the connector.   4 screws.

(7). Slide the tray into ARS-2018 and push it firmly.

(8). Finally push the handle to lock the tray.

(9). Lock.

NOTICE:

(1) Be sure to unlock the tray before removing it.

(2) The provided trays are designed for ACARD ARS-2018/2018E/2019. Do not use any substitutes without ACARD's authorization. ACARD will not maintain or provide any after service/warranty if the problem is due to using a substitute.

2.2 Install HDD into ARS-2018E

(1). Unlock.

(2). Open the tray by pushing the fastener to the left.

(3). Pull the handle to slide the tray out.

(4). Put a hard drive into the tray, and aim its end to the connector of the tray.

(5). Push the hard drive till it attaches the connector.

(6). Turn the tray carefully and fasten with 4 screws.

(7). Slide the tray into ARS-2018E and push it firmly.

(8). Finally push the handle to lock the tray.

(9). Lock.

NOTICE:
(1) Be sure to unlock the tray before re-moving it.
(2) The provided trays are designed for ACARD ARS-2018/2018E/2019. Do not use any substitutes without ACARD's authorization. ACARD will not maintain or provide any after ser-vice/warranty if the problem is due to using a substitute.

2.3 DIP Switch Setting

2.3.1 ARS-2018

Function & SCSI ID Switch
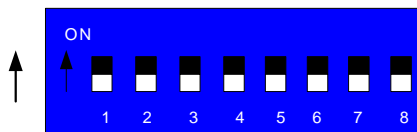
Pin 1-4	SCSI ID
Pin 5	Reserved
Pin 6	ON : SE Mode OFF : LVD Mode
Pin 7	ON : For Narrow SCSI Bus OFF : For Wide SCSI Bus
Pin 8	ON : Terminator Power On OFF : Terminator Power Off

ID=0 (default)   ID=1   ID=2   ID=3

ID=4   ID=5   ID=6   ID=7

N/A (reserved

for the host adapter)

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ID=8   ID=9   ID=10   ID=11

ID=12   ID=13   ID=14   ID=15
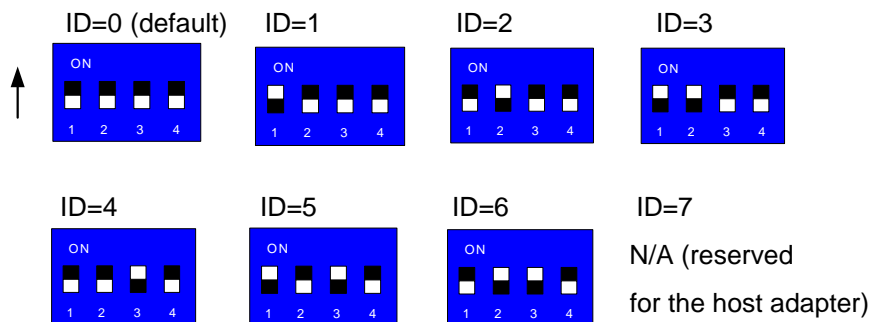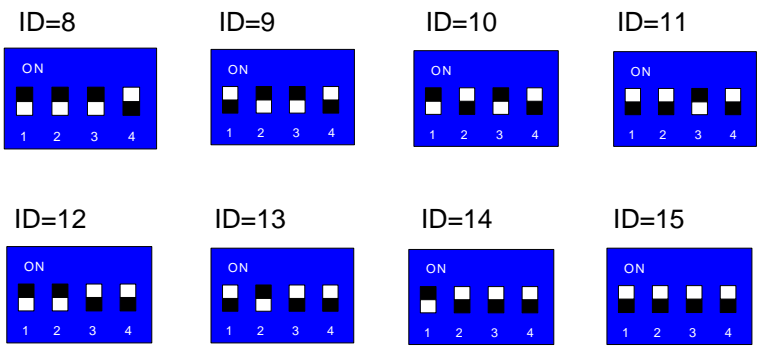
2.3.2 ARS-2018E

Function Switch

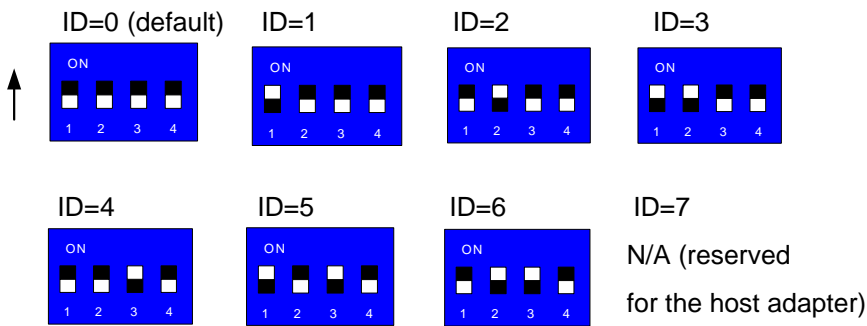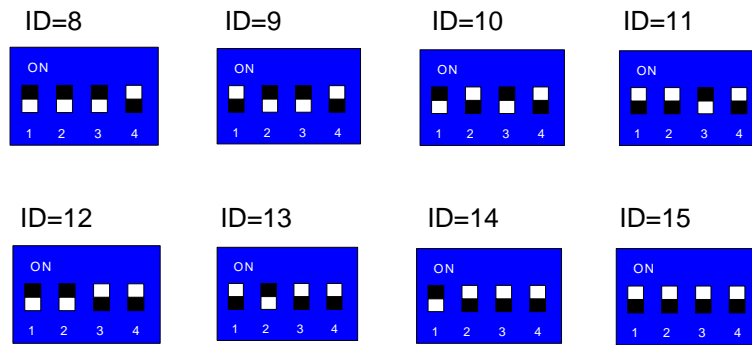| Pin 1	Reserved
Pin 2	ON : SE Mode OFF : LVD Mode
Pin 3	ON : For Narrow SCSI Bus OFF : For Wide SCSI Bus
Pin 4	ON : Terminator Power On OFF : Terminator Power Off

ID=0 (default) ID=1   ID=2   ID=3

ID=4   ID=5   ID=6   ID=7

N/A (reserved

for the host adapter)

ID=8	ID=9	ID=10	ID=11
ON 1 2 3 4	ON 1 2 3 4	ON 1 2 3 4	ON 1 2 3 4

ID=12	ID=13	ID=14	ID=15
ON 1 2 3 4	ON 1 2 3 4	ON 1 2 3 4	ON 1 2 3 4

2.4 Connect ARS-2018 to PC

(1). Open the PC case, insert ARS-2018, and connect two 4-pin power cords to make Mirror Smart work well.
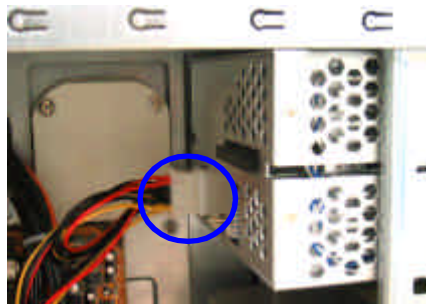
(2). Connect a SCSI cable to the SCSI adapter's internal connector.

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(3). Connect the other end of the SCSI cable to ARS-2018, and attach a terminator.

(4). Fasten with 8 screws, and close the PC case.

2.5 Connect ARS-2018E to PC

Connect one set of ARS-2018E

(1). Insert one end of the SCSI cable into the SCSI adapter's external connector, and the other end into the SCSI connector of ARS-2018E.

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(2). Connect the power cord, and attach a terminator to the other SCSI connector of ARS-2018E.

Connect more sets of ARS-2018E

(1). Insert one end of the 1st SCSI cable into the SCSI adapter's external connector, and the other end into the upper SCSI connector of the 1st set.
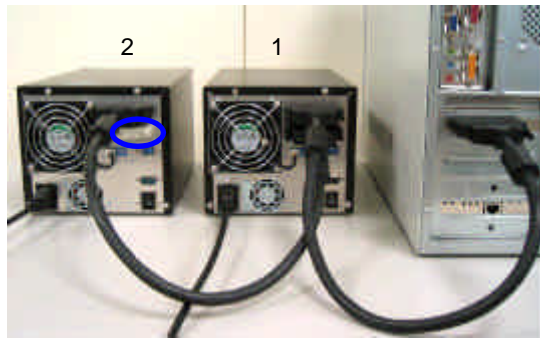

(2). Insert one end of the 2nd SCSI cable into the lower SCSI connector of the 1st set, and the other end into the upper SCSI connector of the 2nd set.
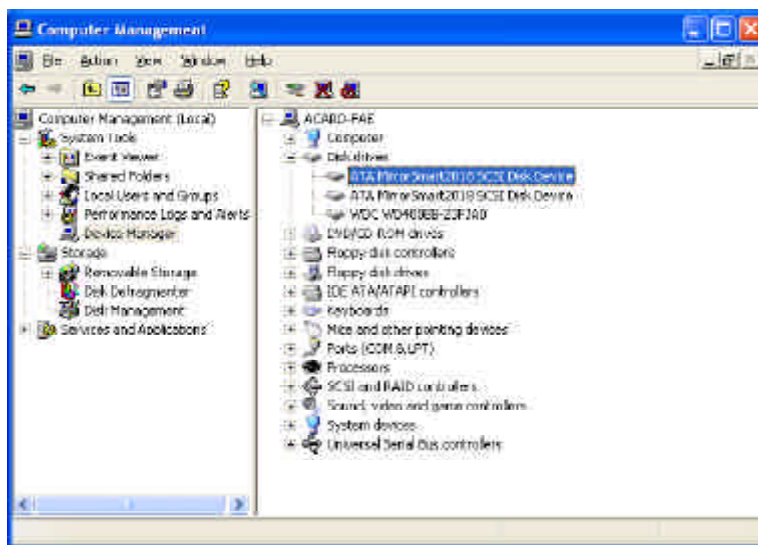
(3). Connect the power cords to each set, and attach a terminator to the last set.
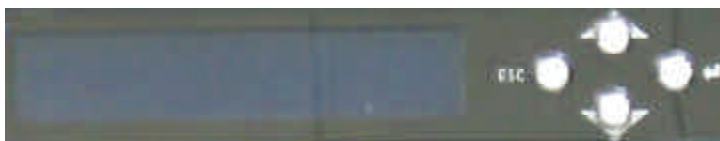

Once installing successfully, you can find ARS-2018/2018E as Mirror Smart 2018 in "Device Manager" under "My Computer".

Chapter 3 The Control Panel

3.1 LCD Panel

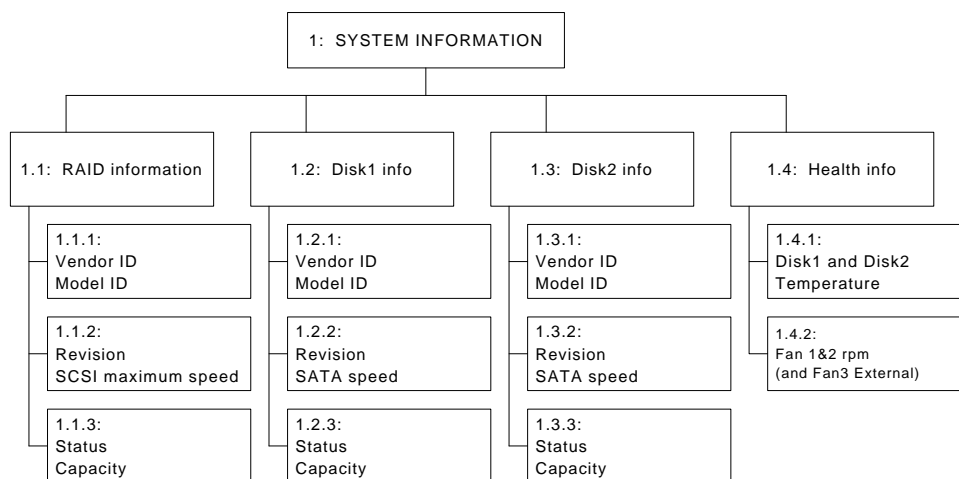▲ : to scroll up the functions or menus.
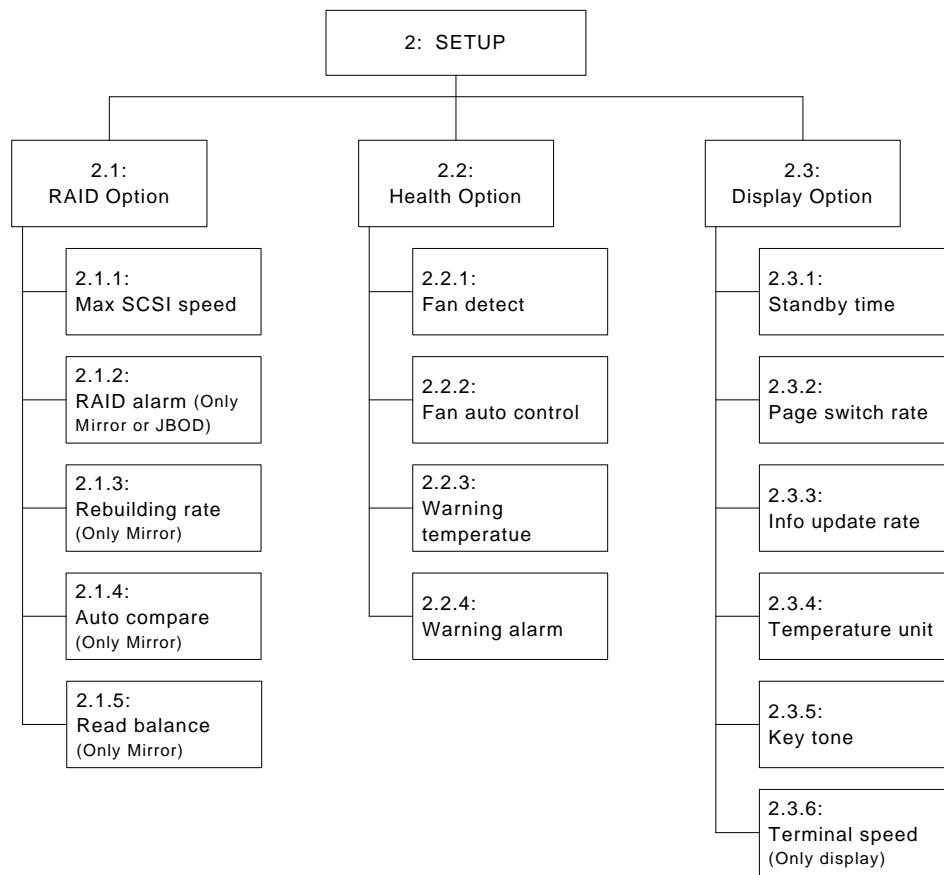
▼ : to scroll down the functions or menus.

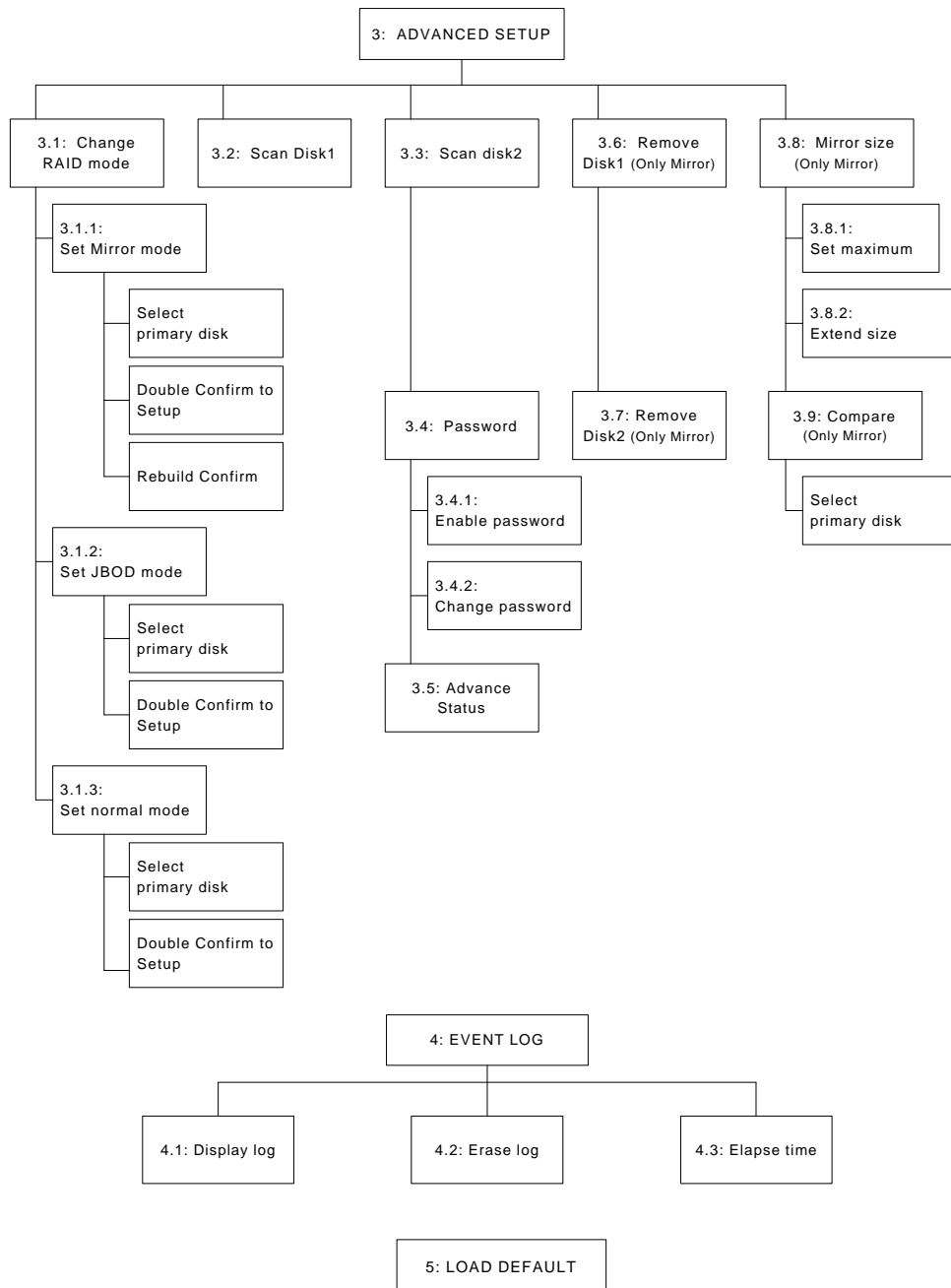↵ : to confirm a setting or enter the selected function.

ESC : to cancel a setting or return to the previous menu.

3.2 LCD Operation

There are 5 major function menus in ARS-2018/2018E as the following charts show.

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```
                        ┌─────────────────┐
                        │  2: SETUP       │
                        └─────────────────┘
         ┌───────────────────────┼───────────────────────┐
┌─────────────────┐    ┌─────────────────┐    ┌─────────────────┐
│ 2.1:            │    │ 2.2:            │    │ 2.3:            │
│ RAID Option     │    │ Health Option   │    │ Display Option  │
└─────────────────┘    └─────────────────┘    └─────────────────┘
   │                      │                      │
┌─────────────────┐    ┌─────────────────┐    ┌─────────────────┐
│ 2.1.1:          │    │ 2.2.1:          │    │ 2.3.1:          │
│ Max SCSI speed  │    │ Fan detect      │    │ Standby time    │
└─────────────────┘    └─────────────────┘    └─────────────────┘
┌─────────────────┐    ┌─────────────────┐    ┌─────────────────┐
│ 2.1.2:          │    │ 2.2.2:          │    │ 2.3.2:          │
│ RAID alarm (Only│    │ Fan auto control│    │ Page switch rate│
│ Mirror or JBOD) │    └─────────────────┘    └─────────────────┘
└─────────────────┘    ┌─────────────────┐    ┌─────────────────┐
┌─────────────────┐    │ 2.2.3:          │    │ 2.3.3:          │
│ 2.1.3:          │    │ Warning         │    │ Info update rate│
│ Rebuilding rate │    │ temperatue      │    └─────────────────┘
│ (Only Mirror)   │    └─────────────────┘    ┌─────────────────┐
└─────────────────┘    ┌─────────────────┐    │ 2.3.4:          │
┌─────────────────┐    │ 2.2.4:          │    │ Temperature unit│
│ 2.1.4:          │    │ Warning alarm   │    └─────────────────┘
│ Auto compare    │    └─────────────────┘    ┌─────────────────┐
│ (Only Mirror)   │                           │ 2.3.5:          │
└─────────────────┘                           │ Key tone        │
┌─────────────────┐                           └─────────────────┘
│ 2.1.5:          │                           ┌─────────────────┐
│ Read balance    │                           │ 2.3.6:          │
│ (Only Mirror)   │                           │ Terminal speed  │
└─────────────────┘                           │ (Only display)  │
                                              └─────────────────┘
```

```
                              ┌─────────────────────┐
                              │ 3: ADVANCED SETUP   │
                              └─────────────────────┘
```

3.1: Change RAID mode	3.2: Scan Disk1	3.3: Scan disk2	3.6: Remove Disk1 (Only Mirror)	3.8: Mirror size (Only Mirror)

3.1.1: Set Mirror mode

- Select primary disk
- Double Confirm to Setup
- Rebuild Confirm

3.1.2: Set JBOD mode

- Select primary disk
- Double Confirm to Setup

3.1.3: Set normal mode

- Select primary disk
- Double Confirm to Setup

3.4: Password

- 3.4.1: Enable password
- 3.4.2: Change password

3.5: Advance Status

3.7: Remove Disk2 (Only Mirror)

3.8.1: Set maximum

3.8.2: Extend size

3.9: Compare (Only Mirror)

- Select primary disk

```
                              ┌─────────────────────┐
                              │ 4: EVENT LOG        │
                              └─────────────────────┘
```

4.1: Display log	4.2: Erase log	4.3: Elapse time

```
                              ┌─────────────────────┐
                              │ 5: LOAD DEFAULT     │
                              └─────────────────────┘
```

1. SYSTEM INFORMATION : the information of the system
    1.1   **RAID information** : the informaiton of RAID subsystem
        Display the RAID subsystem's vendor, model name, firmware version, SCSI speed, RAID mode, RAID capacity.
    1.2   **Disk 1 info** : the information of the upper hard drive
        Display the upper hard drive's brand, model, firmware version, SATA speed, status and capacity.
    1.3   **Disk 2 info** : the informaiton of the lower hard drive
        Display the lower hard drive's brand, model, firmware version, SATA speed, status and capacity.
    1.4   **Health info** : the condition of the system
        Display the hard drive temperature, the fan speed of the trays, and the fan speed of the system.

2. SETUP : the settings of the system configuration
    2.1   **RAID Option** : the RAID configuration
    2.1.1 Max SCSI speed : set the speed limit of SCSI bus
        Options are ASYNC, 10, 20, 40, 80, 160 MB/s. Default is 160MB/s.
    2.1.2 RAID alarm : trigger the alarm. Default is OFF.
        When RAID becomes abnormal, the alarm will be triggered to warn the system administrator.
    2.1.3 Rebuilding rate : set data rebuilding rate
        Options are Slow, Normal, Fast. Default is Normal.
    2.1.4 Auto compare : compare the two hard drives' contents automatically. Default is OFF. This function enables automatic comparison of data after rebuilding.
    2.1.5 Read balance : read the two hard drives' data by turns. Default is ON. This function lets each hard drive's data be read for one minute to prolong the hard drive's life.
    2.2   **Health Opt.** : the setting of the system environment
    2.2.1 Fan detect : detect the rotation of a fan
        This function lets the system produce a warning and show a message whenever the fan is malfunctioned. Default is Enable.

2.2.2 Fan auto control : control a fan automatically

The system will adjust the speed of a fan automatically according to the warning temperature.

2.2.3 Warning Temperature : set the warning temperature

If the system temperature is over the set level, there will be an alarm and a blinking on the screen to warn the system administrator, and the warning will be recorded to the event log.

2.2.4 Warning alarm : trigger the warning alarm

When the system becomes abnormal, the buzzer will be trigger to warn the system administrator.

2.3   Display Opt. : the setting of LCD

2.3.1 Standby time : set the time for the system to return to standby mode

If the system idle time is over the set time, the system will return to standby mode.

2.3.2 Page switch rate : set the rate of information switching

It is to set the time interval of page switching in standby mode.

2.3.3 Info update rate : set the rate of information update

It is to set the update time of the system status.

2.3.4 Temperature unit : set the unit of temperature

It is to set the temperature unit in °C or °F.

2.3.5 Key tone : set the sound of keypad

It is to enable or disable the sound of key pressing.

2.3.6 Terminal speed: display the baud rate

It shows the baud rate 19200bps for an engineer to debug.

3. ADVANCED SETUP : the settings of the advanced functions

3.1   Change RAID mode : set mirroring, JBOD or normal mode

3.1.1 Set Mirror mode : set the system in Mirroring mode

3.1.2 Set JBOD mode : set the system in JBOD mode

3.1.3 Set normal mode : set the system in normal mode

*** See Appendix 3 for the information of RAID.

3.2 Scan Disk 1 : scan the upper hard drive

It is to scan if the upper hard drive is all right. While scanning, the system will ask if you want to continue scanning when it detects a failed track in the hard drive. Once this function is triggered, the menu will change to "Stop scan disk1" automatically so that the system administrator can stop scanning.

3.3 Scan Disk 2 : scan the lower hard drive

It is to scan if the the lower hard drive is all right. While scanning, the system will ask if you want to continue scanning when it detects a failed track in the hard drive. Once this function is triggered, the menu will change to "Stop scan disk2" automatically so that the system administrator can stop scanning.

3.4 Password : the setting of a password

3.4.1 Enable password : enable the password protection

Once you activate the password, the system will ask you to key in the password.

3.4.2 Change password : set a new password

Key in the old password, then key in a new password, and confirm the new password once again to finish the change. If you don't activate the password protection, the function will be hidden.

3.5 Advanced status : the condition of the system

It is to display the scanning or rebuilding or comparing progress.

The progress will be displayed in standby mode, too. If there is nothing proceeding in the system, the function will be hidden.

3.6 Remove Disk 1 : safely remove the upper hard drive (for mirror mode only)

3.7 Remove Disk 2 : safely remove the lower hard drive (for mirror mode only)

3.8 Mirror size : set the Mirror capacity

3.8.1 Set maximum : set the maximum capacity

3.8.2 Extend size : extend the size of Mirror

When the two hard drives of the original system have been changed, and the capacity is bigger than the previous mirroring size, you are allowed to execute this function to extend the size of Mirror. The newly increased capacity will be indicated as the second partition.

3.9 Compare : compare the data
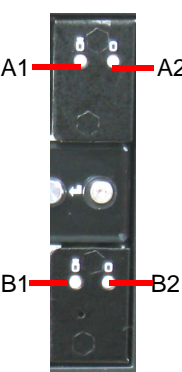
It is to compare if the two hard drives' data are the same. During comparison if there is any data inconsistent, the system will start to rebuild the remaining data from the primary hard drive to the secondary one. Once this function is activated, the menu will change to "Stop compare" automatically so that the system administrator can stop comparing.

4. EVENT LOG : the record of the system events

4.1 Display log : display all records (record limit is 999)

4.2 Erase log : erase all records

4.3 Elapse time : display the uptime since Mirror Smart was turned on

If the system hasn't been restarted over 3 years, the timer will be reset.

5. LOAD DEFAULT : reload the defaults

Once the defaults are restored, the password will be deleted.

3.3 The LEDs

No	Name of LED	Indication
A1, B1	Hard drive power /alarm LED	1. Steady green light means normal power supply. 2. Blinking green light means rebuilding. 3. Steady green with blinking red light means a system problem. See troubleshooting. 4. Steady red light means a hard drive is failed or removed.
A2, B2	Hard drive access LED	The light means busy reading/writing.

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Chapter 4 Troubleshooting

If you have any problem in using ARS-2018/2018E, you can try to solve it by referring to the methods below. But if you still cannot solve, fill in the technical support form at the end of the manual, and send to us.

1. SCSI card could not detect Mirror Smart
- Confirm if Mirror Smart and every hard drive were connected well, and the power switch is ON.
- Confirm if Mirror Smart was connected firmly to the SCSI card by the SCSI cable.
- Confirm if a terminator was added to the end of the SCSI bus.
- Confirm if the ID of Mirror Smart and that of every SCSI device are unique.

2. SCSI card detected an unknown device or a wrong HDD
Usually it is because that Mirror Smart hasn't connected with any hard drive. If the system shows wrong HDD, perhaps the SCSI cable is bad, or the hard drive is not in the support list. Visit ACARD's Web site to get the latest support list, or update to the latest firmware of Mirror Smart to support.

3. Mirror Smart produced an unknown beep or its handle ejected

	Description	LCD	Buzzer	LED
1	Fan failure	Shows the condition by message	A short beep per 8 sec.	None
2	High temperature	Shows the condition by message	Three short beeps per 8 sec.	Alarm LED blinks red with beep
3	Bad sector in HDD	Shows the condition by message	Two shor beeps per 8 sec.	Alarm LED blinks red with beep
4	HDD failure or capacity smaller than the mirror size	Shows the condition by message	Beep in every sec., lasting 10 sec.	Alarm LED blinks red per half sec., lasting 10 sec., and remains red
5	HDD rebuilding	Shows the condition by message	None	Target HDD Alarm LED blinks green per sec.
6	Completion of rebuilding	Shows the condition by message	A long beep	Alarm LED "OFF"
7	HDD comparing	Shows the condition by message	None	Target HDD Alarm LED blinks green per 2 sec.
8	Completion of comparison	Shows the condition by message	A short beep and then a long beep	Alarm LED "OFF"
9	RAID alarm	Shows the condition by message	A long beep and then 5 short beeps	Alarm LED remains red

4. An error happened in accessing Mirror Smart's hard drives

● Confirm if Mirror Smart and SCSI cable are connected properly.

● Confirm if the qualities of SCSI cable and terminator are acceptable. ARS-2018/2018E communicates with the SCSI card in 160MB/s of transfer rate, so if the SCSI cable or terminator is bad, the electronic signal will be unstable. Whenever there is a problem happening, try to lower the transfer rate to verify if it is the problem of SCSI cable. Choose a SCSI cable and a terminator carefully.

● If it's the problem of a bad drive, replace it and configure Mirror Smart again.

5. Update the firmware of Mirror Smart and change the mirror size
      Refer to Appendix 2.

6. OS didn't detect Mirror Smart's hard drives
- Confirm if the SCSI card has been correctly installed (see the following steps 1 to 3).
- If the installation of driver is correct, confirm if Device Manager has detected the disk of Mirror Smart (see step 4).
- If the hard drive is new, initialize, partition and format it with the disk management tool (see step 5).

Step 1. Right-click "My Computer" to choose "Manage".

Figure 4-1

Step 2. Enter "Computer Management" to choose "Device Manager".
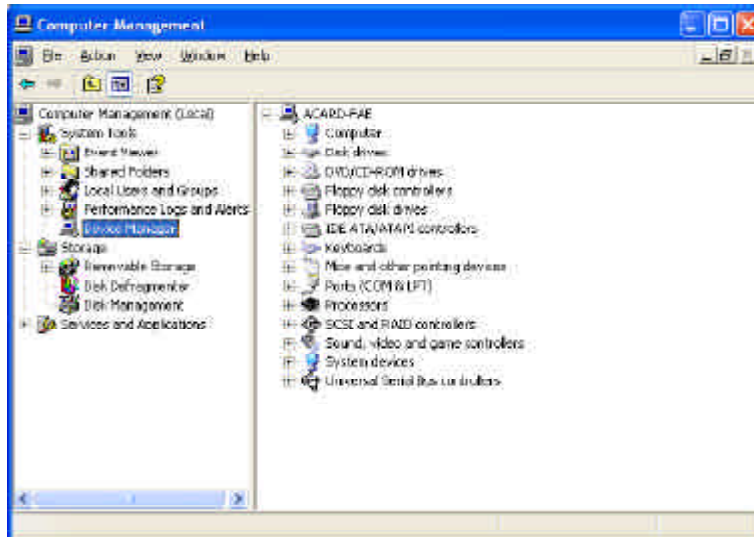
Figure 4-2

Step 3. In "Device Manager" double click "SCSI and RAID controllers" to examine if the driver of SCSI card has been correctly installed.
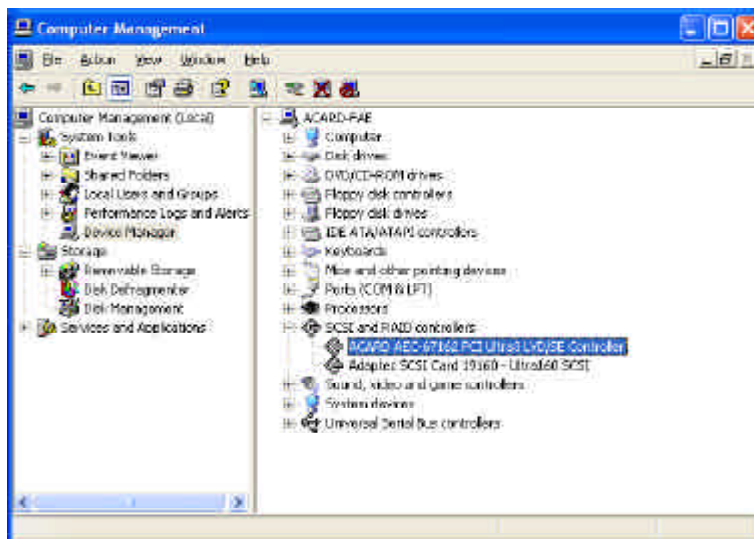
Figure 4-3

Step 4. In "Device Manager" double click "Disk drives" to confirm if the system has detected the disk of Mirror Smart.
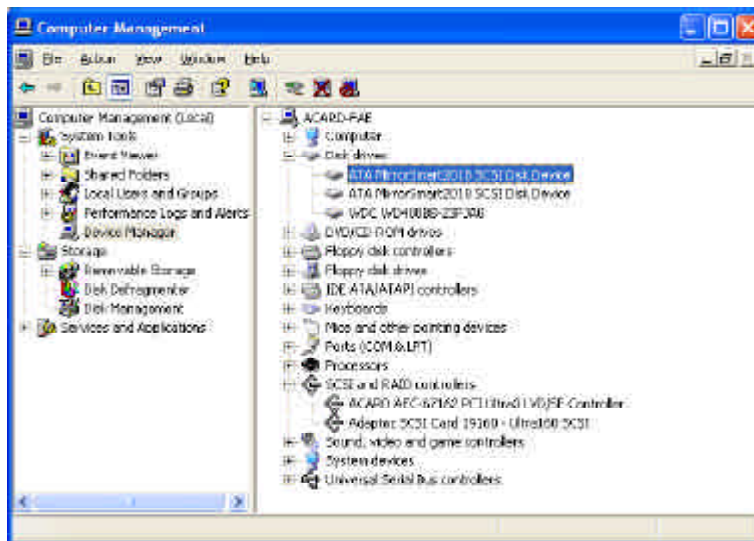
Figure 4-4

Step 5. Add a new partition for the hard drive of Mirror Smart in the "Disk Management" so as to access the new hard drive.
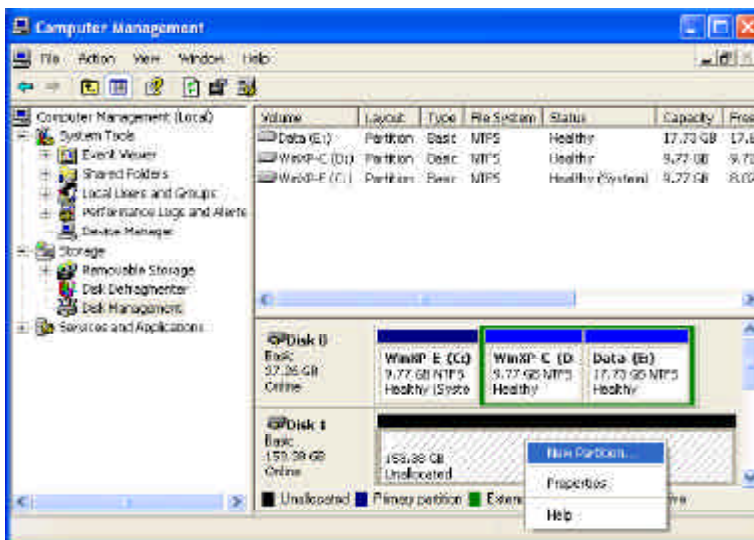
Figure 4-5

The following figure shows the condition of the hard drive after partition.
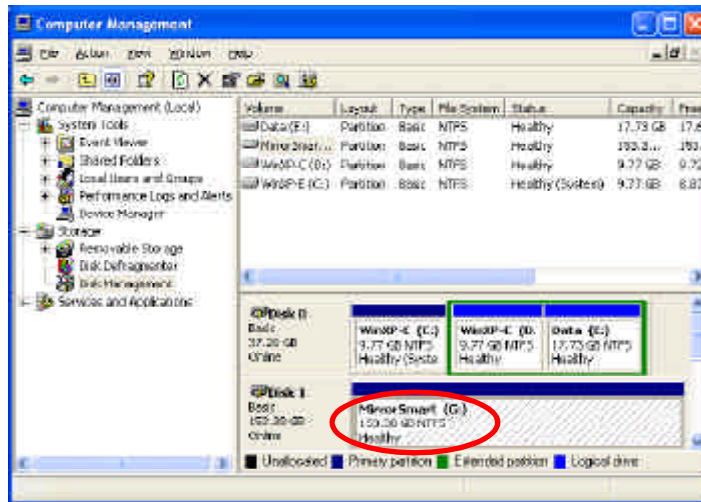
Figure 4-6

Appendix 1 Migrate Existing HDD to Mirror

1. Migrate the current SATA HDD (source HDD A for storing data) into Mirror Smart to form a new mirroring disk

Step 1. Take two empty trays out of Mirror Smart.

Step 2. Put source HDD A into one tray, install and place it into Mirror Smart.

Step 3. Connect Mirror Smart to SCSI card according to section 2.4 or 2.5.

Step 4. Power on Mirror Smart and then computer. Be sure that Mirror Smart's hard drive power LED is steady green light. Begin to access the data of SCSI hard drive formed by mirroring according to the user's manual of SCSI card.

Step 5. Put the newly purchased tartget HDD into another tray, install and place it into Mirror Smart. Now Mirror Smart will copy the data of source HDD A to target HDD. In rebuilding, any access won't affect the rebuilt data.

2. Migrate the current SATA HDD (source HDD B with booting OS) into Mirror Smart, and boot from the HDD on Mirror Smart

Step 1. Before migrating source HDD B into Mirror Smart, back up its important data first. Then, boot from source HDD B, and install the driver of SCSI card to verify if the OS recognizes Mirror Smart.

Step 2. Shut down. Remove source HDD B from the SATA port. Then, put it into one tray, install and place it into Mirror Smart.

Step 3. Connect Mirror Smart to SCSI card according to section 2.4 or 2.5.

Step 4. Power on Mirror Smart and then computer. Be sure that Mirror Smart's hard drive power LED is steady green light.

Step 5. Enter the motherboard BIOS, and go to the Boot Device section. Set the SCSI hard drive as the lst boot device. Save the setting and exit.

Step 6. Reboot. Then you will enter OS and access the hard drive successfully.

Step 7. Put the newly purchased target HDD into another tray, install and place it into Mirror Smart. Now Mirror Smart will copy the data of source HDD B to target HDD. In rebuilding, any access won't affect the rebuilt data.

This method is fit for most PC systems and Windows platforms. If you cannot boot

from Mirror Smart according to the above steps, try the third method.

3. Install two new SATA HDDs (newly purchased or fine) and a new OS (e.g. Windows XP) into Mirror Smart

Step 1. Take two empty trays out of Mirror Smart.

Step 2. Put the new hard drives into the trays, install and place them into Mirror Smart separately.

Step 3. Power on Mirror Smart and then computer. Be sure that Mirror Smart's hard drive power LED is steady green light.

Step 4. After booting, if everything is right and the two hard drives are equal in capacity, Mirror Smart will regard the hard drive on the upper tray as the source and that on the lower tray as the target, and begin to rebuild.

Step 5. Enter the motherboard BIOS, and go to the Boot Device section. Set the CD-ROM and SCSI hard drive as the 1st and 2nd boot devices. Save the setting and exit.

Step 6. Put the OS installation disc into CD-ROM and boot hence. Before installing the OS, install the driver of SCSI card first if necessary.

Step 7. After installing the OS, install the Mirror Smart Utility to monitor the unit.

NOTICE: In a set of Mirror Smart you are suggested to use two identical hard drives. If you replace a failed hard drive with a new one, the new hard drive's capacity must be equal or larger than the original one's.

Appendix 2 Mirror Smart Utility

The Mirror Smart Utility is used to manage and control ARS-2018/2018E. With it you can easily set, change and monitor the status of Mirror Smart.

After entering the utility, if you want to change some basic settings, you can click "Setup" and select "Preference" as shown below.
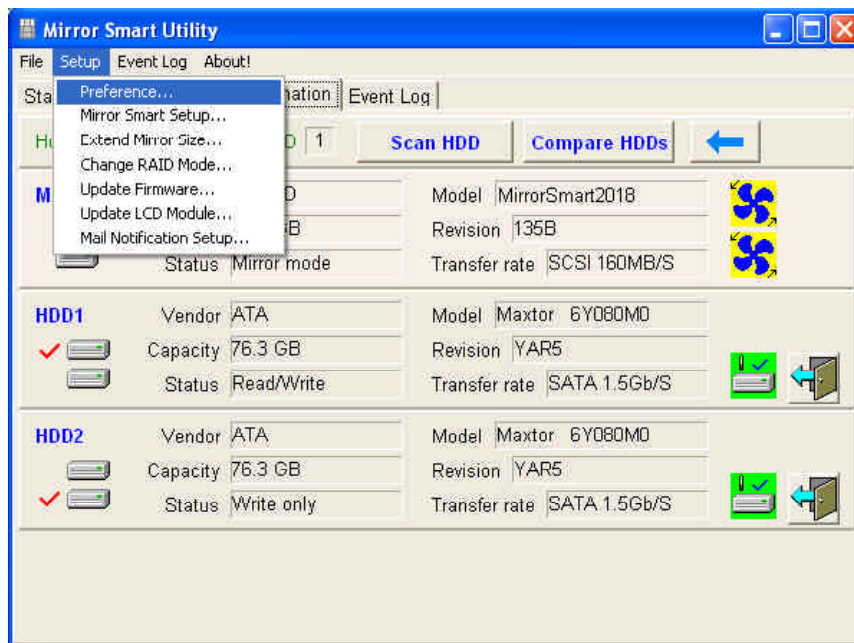
The main items in "Preference" are explained as follows.
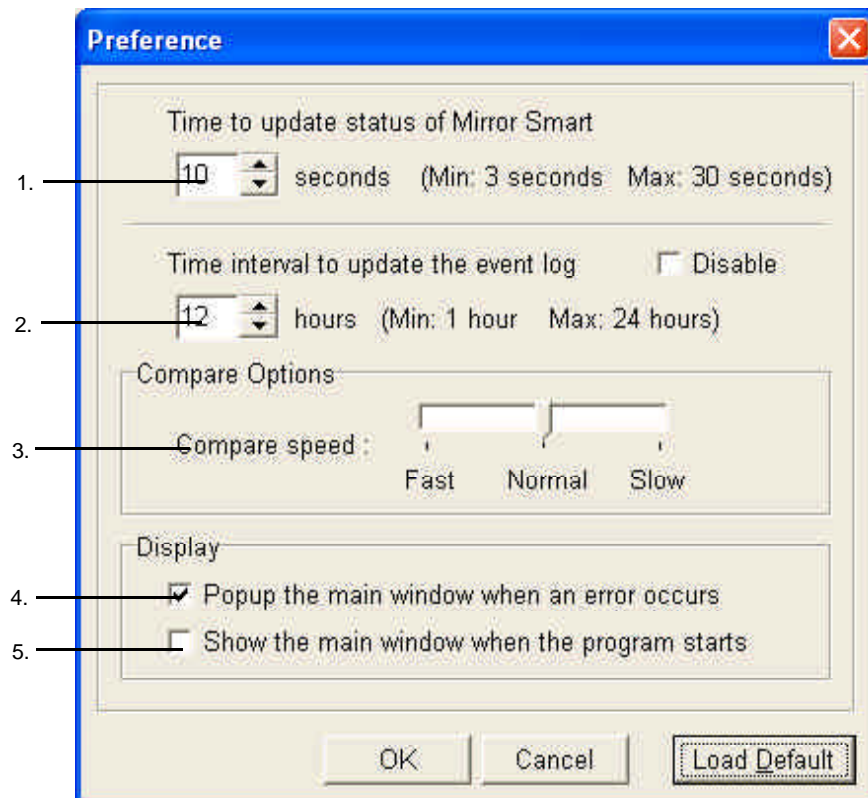
1. Set the updating time of the system conditions.
2. Set the time interval to record the system conditions.
3. Set the speed of data comparing.
4. Set to reveal this utility when anything wrong happens.
5. Set to reveal this utility when the system is booted.

If you want to set the functions of Mirror Smart, you can click "Setup" and select "Mirror Smart Setup" as shown below.
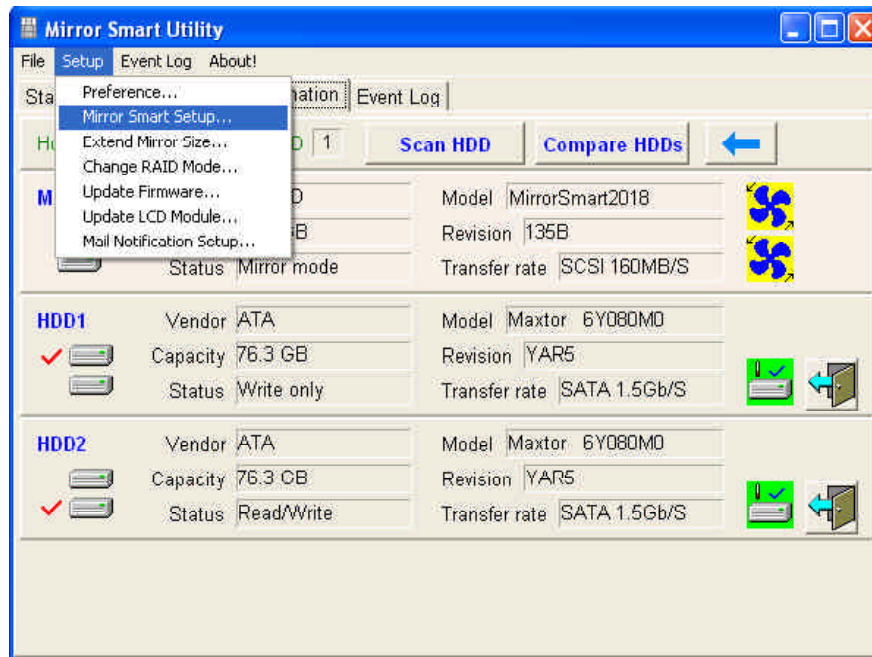
The main items in "Mirror Smart Setup" are explained as follows.
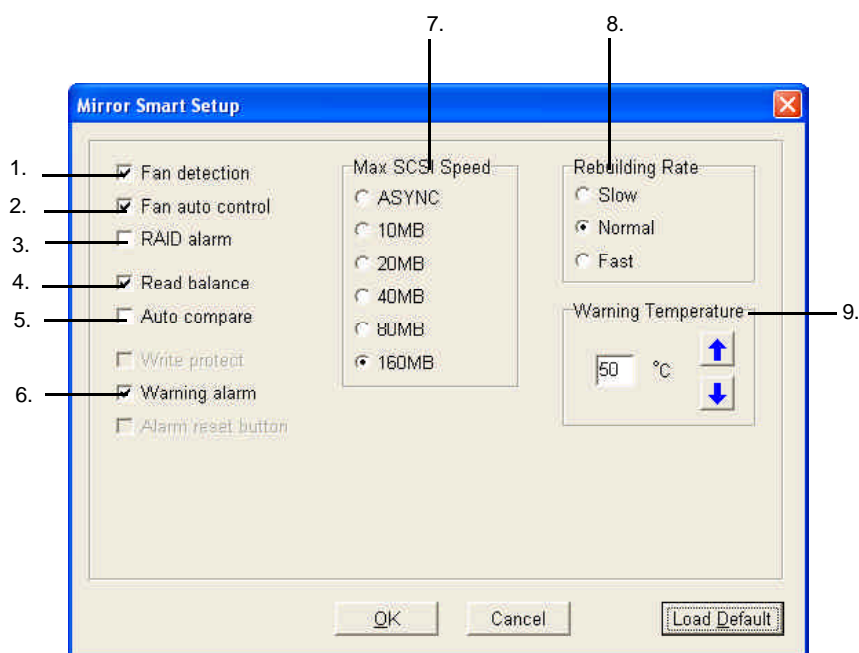
1. The system will produce a warning and show a message when the fan is malfunctioned.
2. The system will adjust the speed of fans automatically according to the warning temperature.
3. The alarm will be triggered to warn the system administrator when RAID becomes abnormal.
4. Each hard drive's data will be read for one minute to prolong the drive's life.
5. Automatic comparison after data rebuilding.
6. The buzzer will be triggered to warn the system administrator when the system becomes abnormal.
7. The speed limit of the SCSI bus.
8. The speed of data rebuilding
9. If the system temperature is over the set level, there will be an alarm and a blinking on the screen to warn the system administrator, and the warning will be recorded to the event log.

If you want to change the RAID mode, you can click "Setup" and select "Change RAID mode" as shown below.
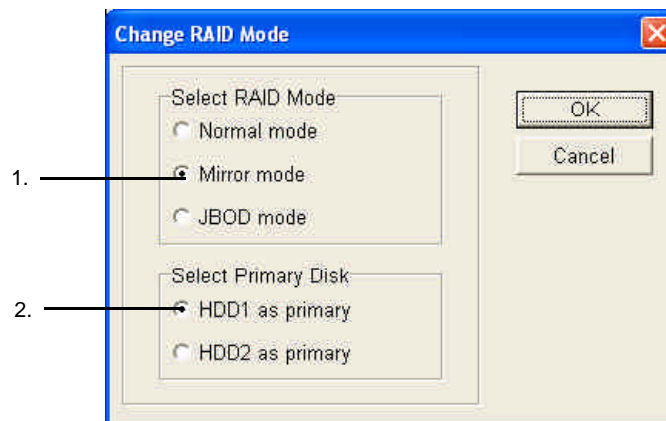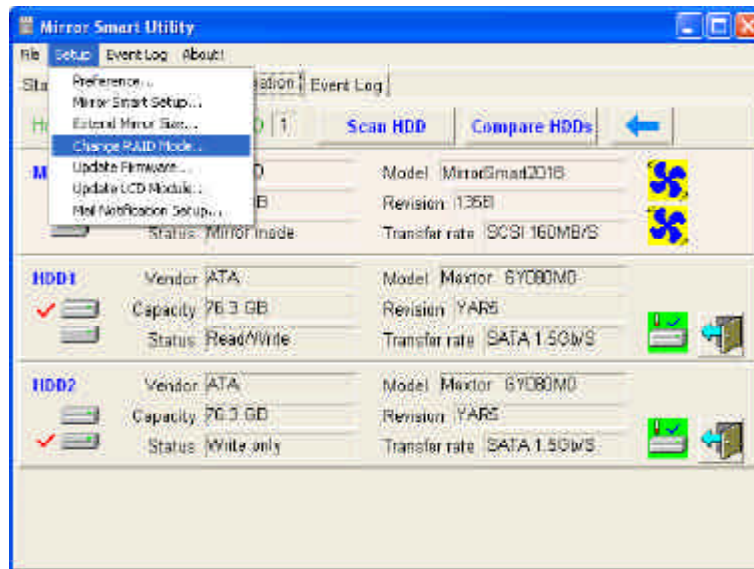
1. Select the RAID mode.
2. Select a hard drive as the primary disk.

If you want to change the size of Mirror Smart, you can click "Setup" and select "Extend Mirror Size" as shown below.
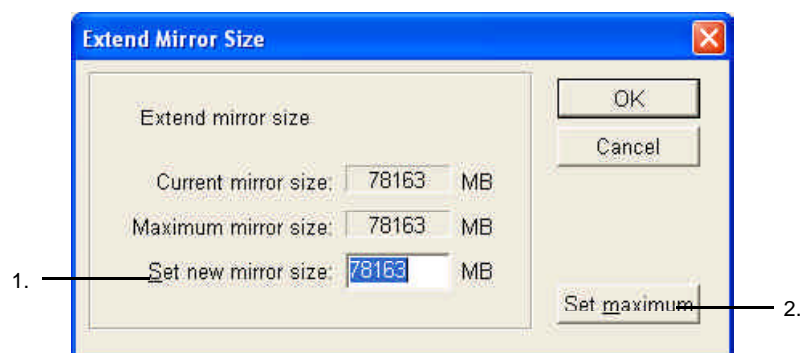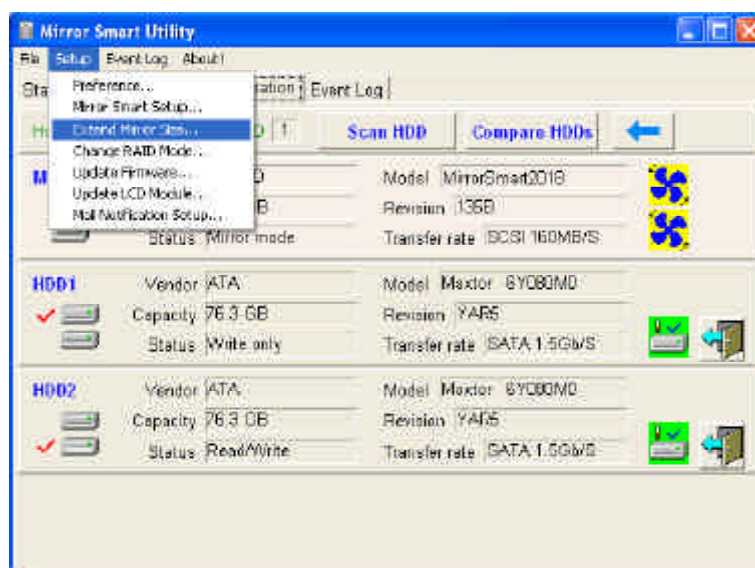
1. Set a new size equal to or larger than the current one.
2. Set the maximum size.

If the current size is the maximum size, you cannot change the size again.

If you want to update the firmware of Mirror Smart, you can click "Setup" and select "Update Firmware" as shown below.

1.

2.

3.
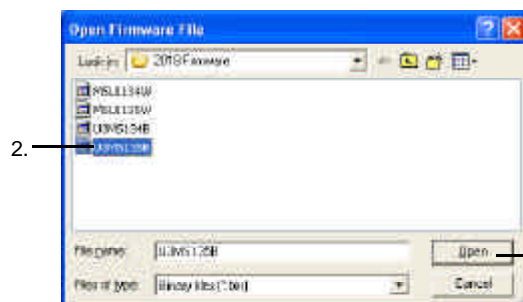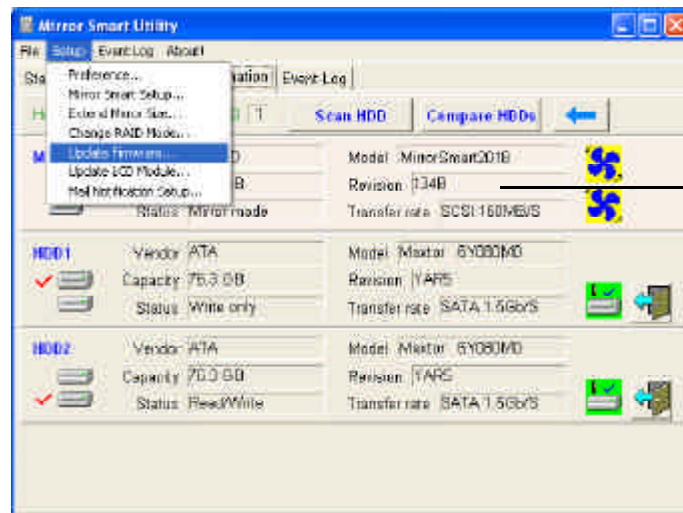
1. The current F/W version.
2. Update to the newest version.
3. Click "Open" and then "Yes" to confirm.

Confirm the firmware update.
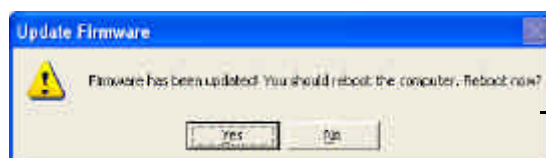
Completion

If you want to update the firmware of the LCD module in Mirror Smart, you can click "Setup" and select "Update LCD Module" as shown below.
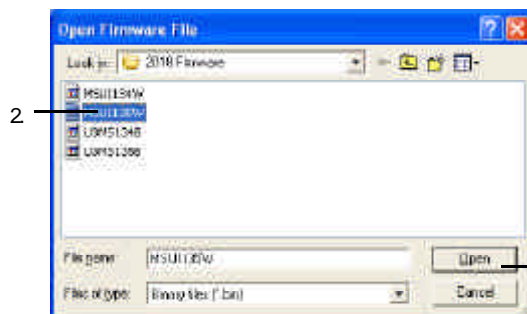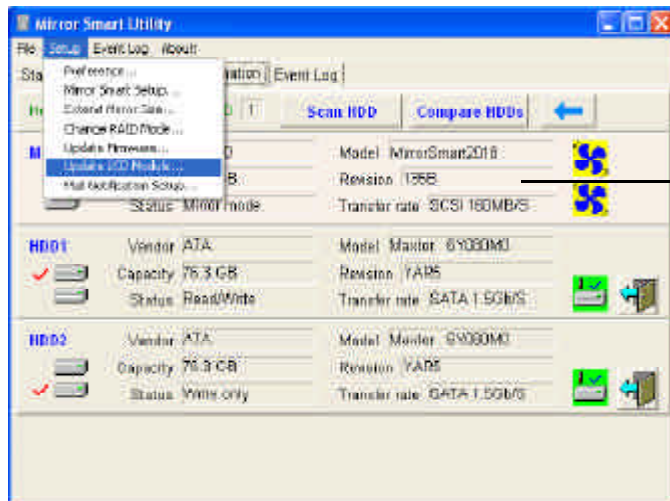
1. The current F/W version.
2. Update to the newest version.
3. Click "Open" and then "Yes" to confirm.
4. It is under update.

3.

4.
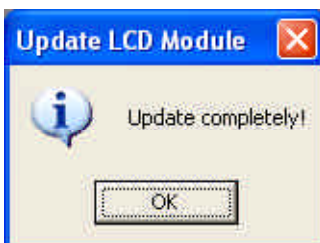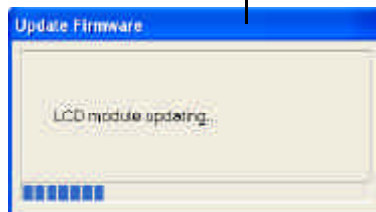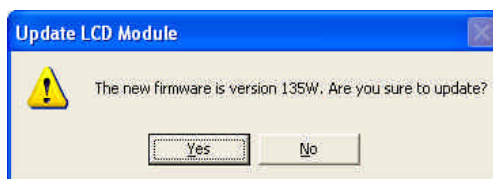
After firmware update, the LCD module will automatically restart. You don't need to reboot the computer.

If you want to receive a mail when system or a hard drive fails, you can click "Setup" and select "Mail Notification Setup" as shown below. Then, in "Mail Setup" be sure that Enable mail notification is activated. And type related data in the following three rows: 1. SMTP server, 2. User account, 3. Sender Email.
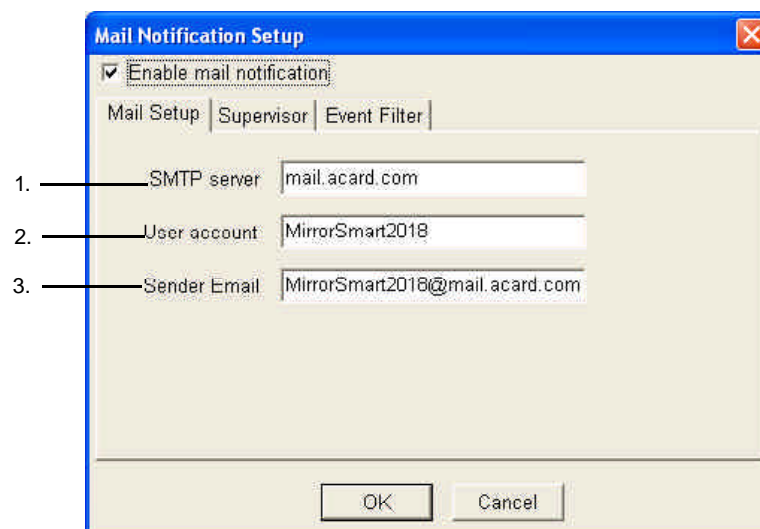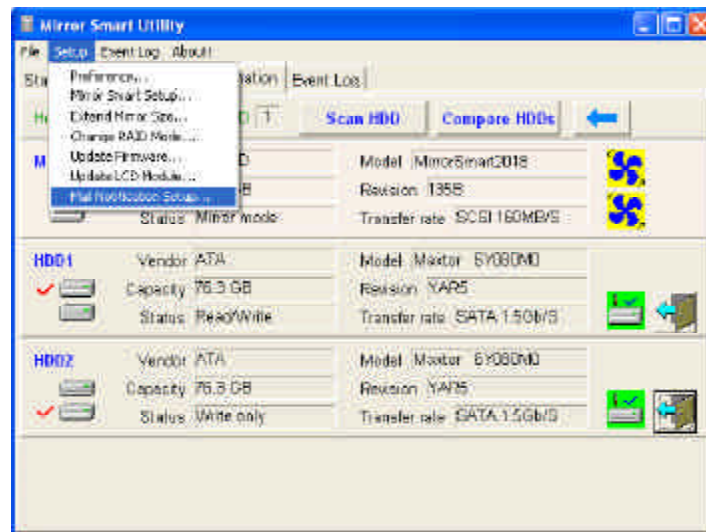
Then click "Supervisor", and type the receiver's mail address in the row near to the bottom. After clicking "Add", the address will be added to the list.
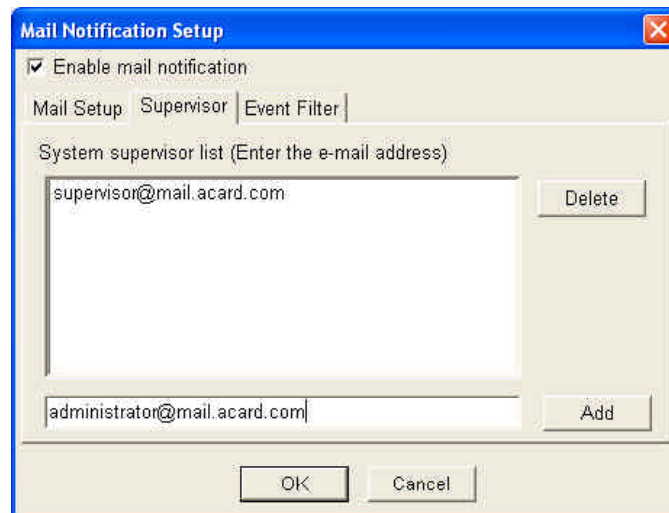
Finally click "Event Filter", and choose one or more than one events for which you will send a mail to notify the supervisor. There are six events for choice: 1. HDD failed, 2. HDD is removed, 3. HDD is inserted, 4. Fan failed, 5. HDD over heat, 6. HDD rebuilding/compare.

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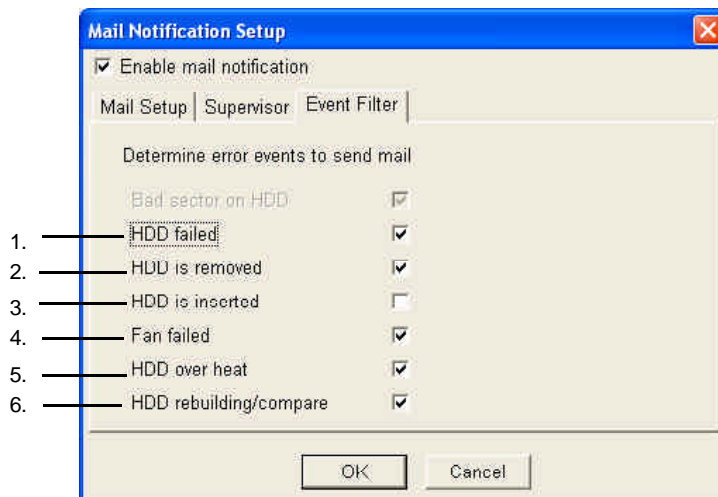
If you want to know the version of Mirror Smart Utility, you can click "About!".
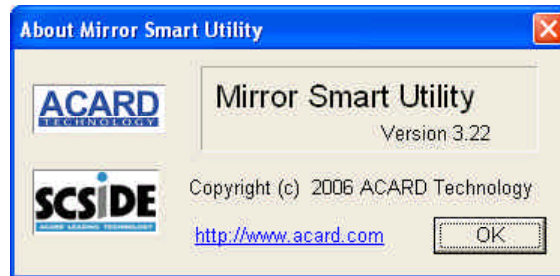
Click "Status List" to see the status of Mirror Smart.
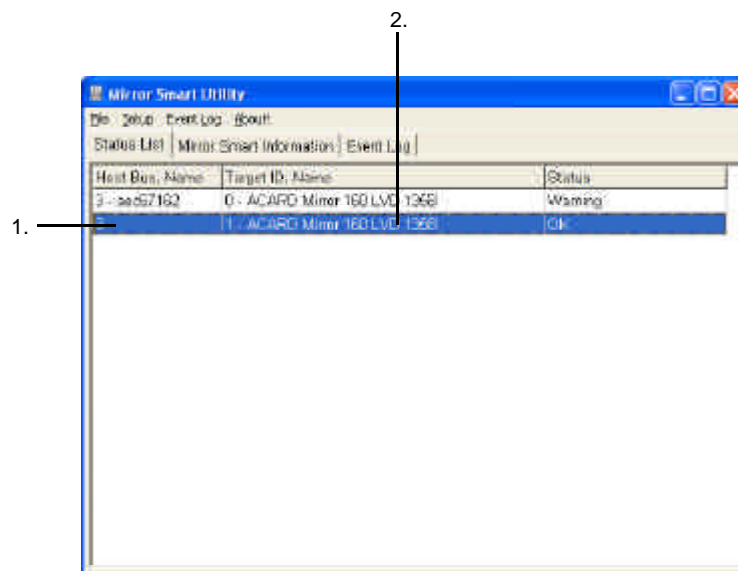
1. Host Bus ID No. and the SCSI adapter.
2. Target ID No. and the Mirror Smart.

Click "Mirror Info" to see all information of the hard drives and the status of Mirror.
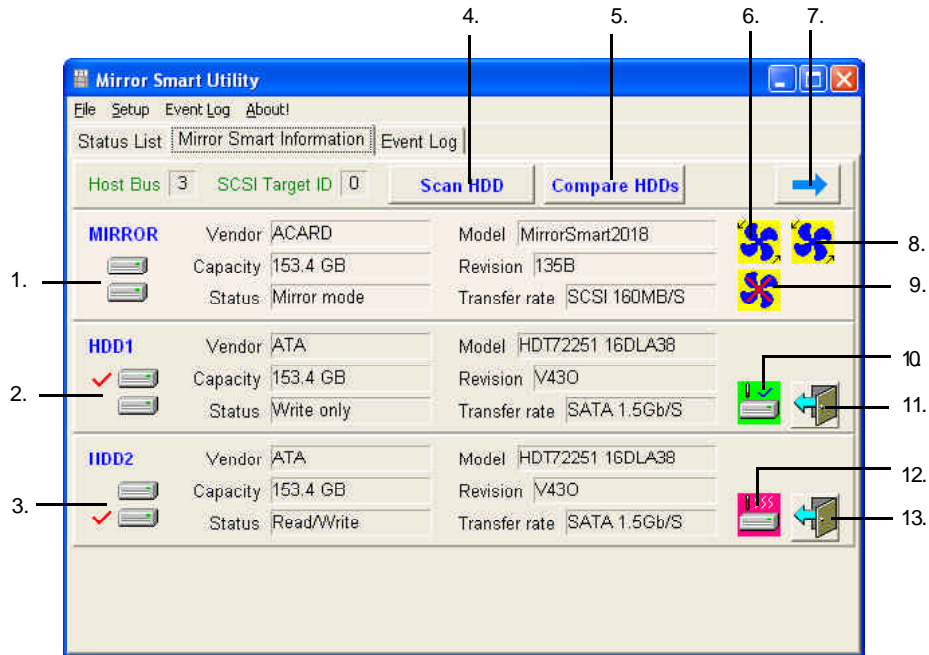
1. The system's firmware version, capacity, status, SCSI bus speed as one HDD.
2. HDD's frimware version capactiy, status, SATA bus speed in the upper tray.
3. HDD's frimware version, capacity, status, SATA bus speed in the lower tray.
4. Scan the HDD.
5. Compare the two HDDs' data.
6. The good fan 1.
7. See the information of other Mirror Smarts.
8. The good fan 3 (for ARS-2018E only).
9. The failed fan 2.
10. The temperature of the HDD in the upper tray (normal).
11. Remove the HDD in the upper tray safely (for Mirror only).
12. The temperature of the HDD in the lower tray (too high).
13. Remove the HDD in the lower tray safely (for Mirror only).

Click "Compare HDDs" to see if the Source HDD and the Target HDD contain the same data. The percentage bar on the bottom of the figure shows the process of comparison or rebuilding.
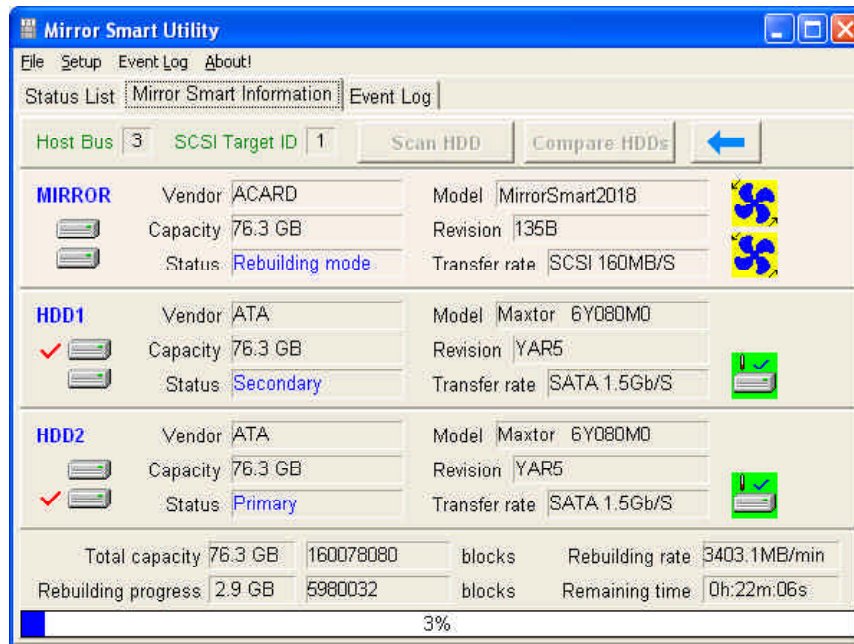
If you didn't install a hard drive, the status will be shown as follows.
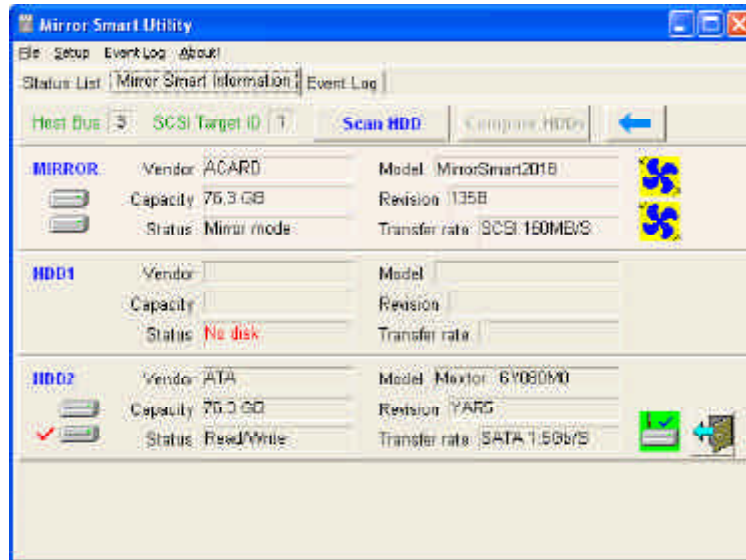
If the system didn't detect the hard drive, or the hard drive is failed, the status will be shown as follows.
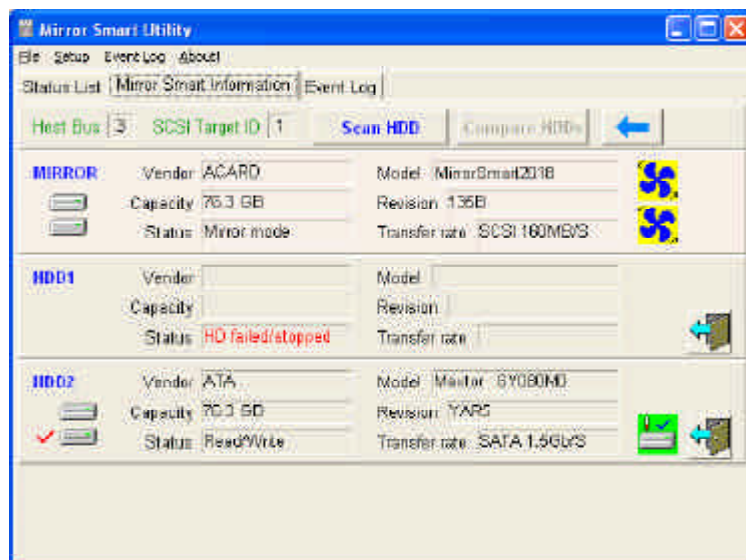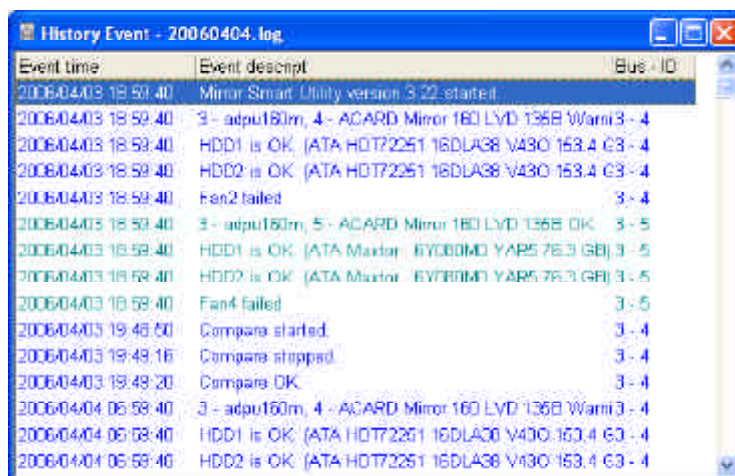
If you want to read the record of an event log, click "Open Event Log" under "Event Log". Then, choose the file you need.
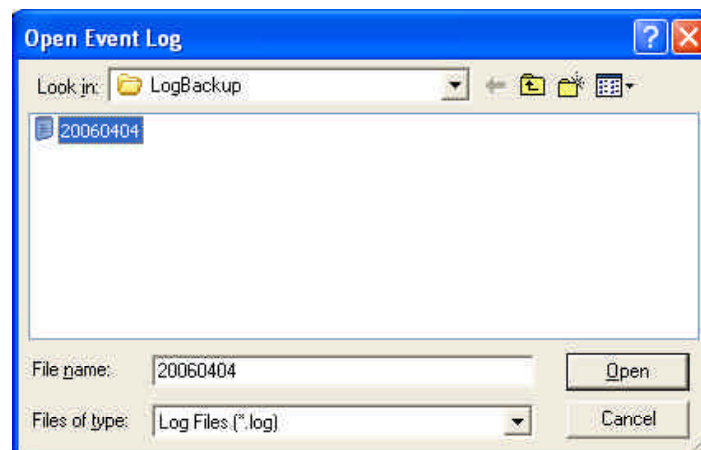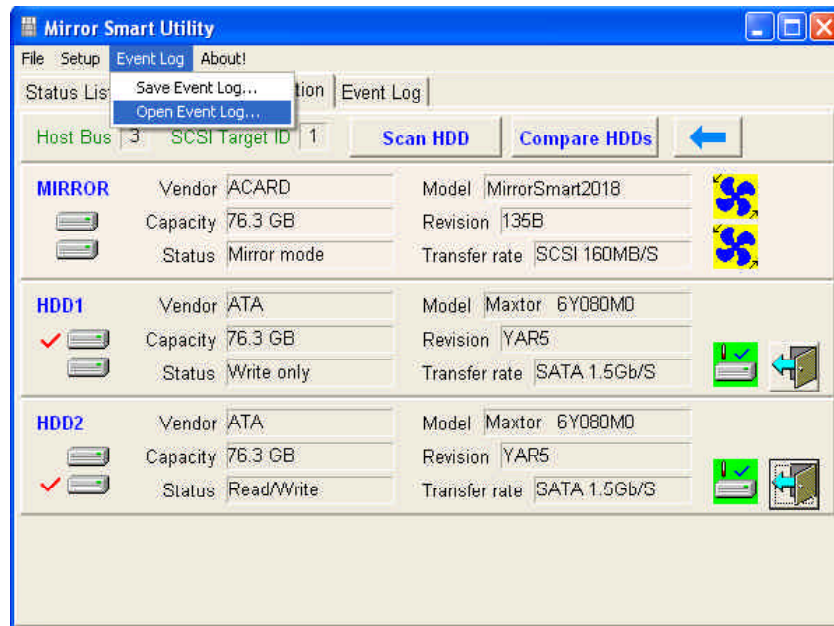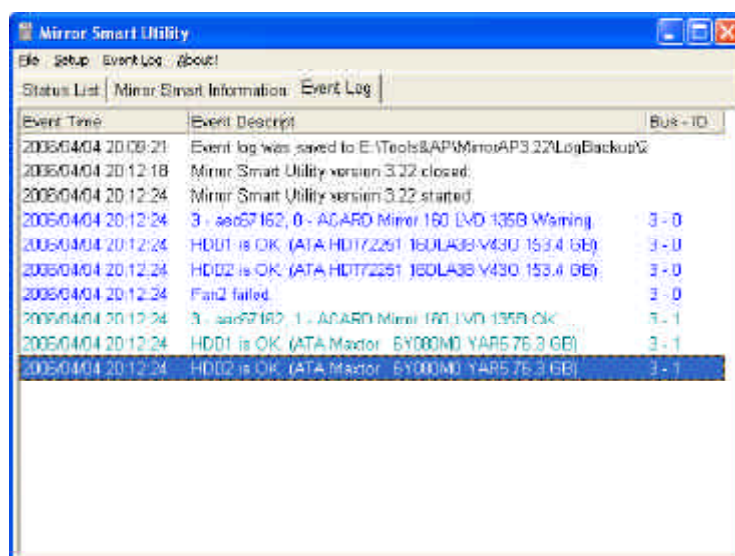
Click the file to read as the following figure shows.

The "Event Log" describes the time and status when an event happens. It is helpful for you to solve the problems.

Appendix 3 About RAID

RAID (Redundant Array of Independent Disks) is a system composed of many hard drives; that is, multiple physical drives form a single virtual drive to be recognized by the system. The advantages of RAID technology are increasing the read/write speed of a hard drive, achieving better data protection, and enlarging the capacity of a single drive like Drive C, Drive D, etc. Different classes of RAID have different composition modes and different functions.

RAID 0 (Striping)

RAID 0 must be composed of a pair of hard drives at least. When data are written into the whole hard drive, they will be equally striped and written into each hard drive of the array. Thus the access speed becomes quicker. The effect of RAID 0 is proportioned to the number of hard drives. More hard drives mean more read/write heads, and therefore the speed is quicker. Though RAID 0 is quick in read/write speed, it has no data redundancy, and accordingly has no fault tolerance.
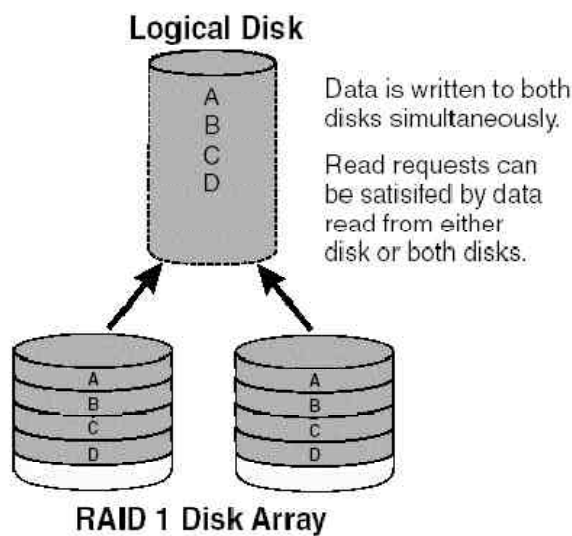
It is suggested to compose RAID 0 with hard drives of the same capacity. Because the capacity of striped disk array is the multiplication of the smallest hard drive capacity with the number of hard drives. For example, a 100GB hard drive and a 120GB hard drive unite into RAID 0. The total capacity is 200GB (100GB×2).


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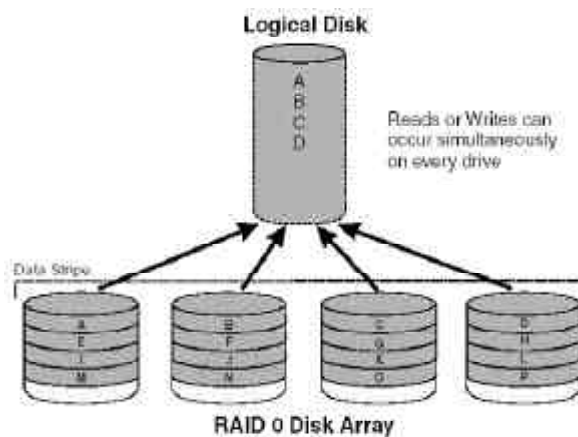
RAID 1 (Mirroring)

RAID 1 must be composed of hard drives in even number. The RAID controller will divide the hard drives into a pair, and write data simultaneously into the two hard drives. The two hard drives contain the same data. When one hard drive's data are damaged, you can replace the failed hard drive, and the RAID controller will restore the data by the backup on the other hard drive. For a single hard drive RAID 1 is the best in fault tolerance.

It is suggested to compose RAID 1with hard drives of the same capacity. Because the capacity of mirrored disk array is that of the smallest hard drive. For example, a 100GB hard drive and a 120GB one unite into RAID 1. The total capacity is 100GB.

Logical Disk

A
B
C
D

Data is written to both disks simultaneously.

Read requests can be satisifed by data read from either disk or both disks.

RAID 1 Disk Array

JBOD (Just a Bunch of Disks)

JBOD, formal word spanning, is not a real RAID setting. It simply links a bunch of disks into a big hard drive. It doesn't have the functions of quick read/write speed and error tolerance. However, compared with RAID 0, JBOD doesn't waste the hard drive capacity. Its capacity is the total of all hard drive capacities. For example, set a 100GB hard drive and a 120GB one as JBOD. The total capacity is 220GB.
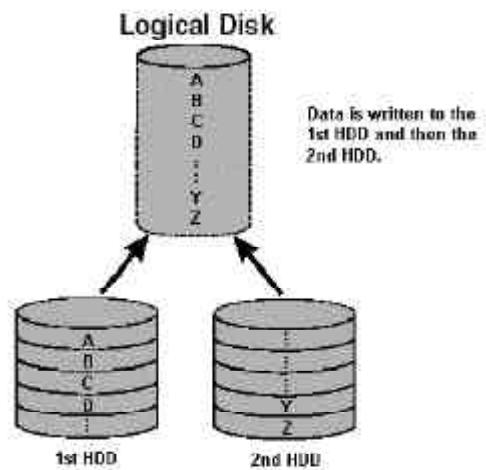
Appendix 4 SCSI Adapter Compatibility

Generally speaking, a SCSI adapter can be compatible with ARS-2018/2018E if they meet the SCSI operation protocol. All the SCSI adapters listed below are compatible with ARS-2018/2018E.

ACARD AEC-67160
ACARD AEC-67162
Adaptec ASC 29160
Adaptec ASC 39160
Adaptec AHA 2940U2W
Adaptec AHA 2940UW
Initio 9100UW
Tekram DC-390U2W(53C895)
Tekram DC-390U3W
Tekram 390UF LSI Symbios 53C875 Ultra Wide SCSI Controller

If your SCSI adapter cannot be compatible wtih ARS-2018/2018E, fill in the technical support form on the next page and send to us for quick service.

Technical Support Form

Email: **support@acard.com**

http://www.acard.com

Model:	ARS-2018/2018E	***F/W Version:**	
System Configuration			
Motherboard *			
BIOS version			
SCSI adapter *			
Chipset			
Memory			
Display card			
Other I/O card *			
OS version *			
Hard Disk	Tray 1	Tray 2	
Brand *			
Model *			
Capacity *			
Problem description * :			

Required columns are marked with asterisks (*) .